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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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NOVAK DRUCE DELUCA & QUIGG, LLP, 1300 EYE STREET NW SUITE 400 EAST WASHINGTON, DC 20005				
			EXAMINER KERNS, KEVIN P	
			ART UNIT 1725	PAPER NUMBER

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/936,354

Applicant(s)

OLBERT ET AL.

Examiner

Kevin P. Kerns

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-27 is/are pending in the application.
- 4a) Of the above claim(s) 20-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-19, 26 and 27 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☒ Claim(s) 12-27 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO 152)

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 22-25 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons (as disclosed in the Office Action mailed on March 1, 2004, as set forth in the following paragraphs). Since the applicants have received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 20-25 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claims 12-19, 26, and 27, drawn to a multitube reactor.

Group II, claims 20-25, drawn to methods of reaction.

3. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or

Art Unit: 1725

corresponding special technical features for the following reasons: claim 12 is either obvious over or anticipated by Ruppel et al. (US 5,821,390; particularly the Figure; column 2, lines 3-19; column 6, lines 3-12; and the Examples in columns 7-9).

Accordingly, the special technical feature linking the two inventions (i.e. a multitube reactor with 10,000 to 50,000 catalyst tubes within an outer wall, a means for introducing and discharging a heat transfer medium, and a tube spacing to tube diameter ratio) does not provide a contribution over the prior art. Therefore, there is no unity of invention and lack of unity is held by the examiner.

4. During a telephone conversation with David Liechty on February 19, 2004 a provisional election was made with traverse to prosecute the invention of Group I, claims 12-19 (currently claims 12-19, 26, and 27). Affirmation of this election must be made by applicant in replying to this Office action. Claims 20 and 21 (currently claims 20-25 of Group II) are withdrawn from further consideration by the examiner, 37 CFR 1.14207), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In this instance, the phrase "The present invention relates to a" should be replaced with "A".

7. The disclosure is objected to because of the following informalities: throughout the Examples section on pages 11 and 12 of the original specification, all instances of numbers that have commas in place of decimals should be replaced by periods. On page 13 of the October 4, 2004 amendment, reference to claim 12 should be replaced, as claim numbering frequently changes throughout prosecution of the application. In this instance, "of claim 12" should be replaced with "described herein". Appropriate correction is required.

Claim Objections

8. Claim 12 is objected to because of the following informalities: in the 4th line, a comma should be added after "medium" for clarity. Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 12, 19, 26, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruppel et al. (US 5,821,390).

Ruppel et al. teach a multitube reactor with a catalyst tube bundle arranged within an outer wall. The tube bundle includes 5,000 to more than 40,000 tubes. The reactor has means for introducing and discharging a heat transfer medium that flows around the catalyst tubes radially or transversely (meandering path) around the tubes. The tubes have a length of 2-4 m. Ruppel et al. teach that the ratio of tube spacing to the external diameter of the catalyst tubes is 1.1-2.1 (with a narrower range of 1.2-1.5 when the external diameter of the tube is 30mm, and a specific value of 1.3 when the spacing between tubes is 38mm – see Examples section, column 7). The reactor is also divided in the longitudinal direction of the tubes into several zones so that heat transfer medium will have different temperatures in the different zones due to the transfer of heat (see US 5,821,390; particularly the Figure; column 2, lines 3-19; column 6, lines 3-12; and the Examples in columns 7-9).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 12, 19, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruppel et al. (US 5,821,390).

Ruppel et al. (in the absence of the Examples in paragraphs 7-9) disclose a ratio of tube spacing to the external diameter of the catalyst tubes of 1.1-2.1, which entirely encompasses the applicants' ratio range of 1.3-1.6. However, one of ordinary skill in the art would have recognized that the range of ratios disclosed by Ruppel et al. would be selected by routine experimentation to optimize the operation of the reactor (e.g.

Art Unit: 1725

heat transfer, efficiency etc.). Furthermore, a *prima facie* case of obviousness exists per MPEP 2144.05 as follows:

"In the case where the claimed ranges 'overlap or lie inside ranges disclosed by the prior art', a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)...Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)".

"A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). The CAFC stated: "Selecting a narrow range from within a **somewhat** broader range disclosed in a prior art reference is no less obvious than identifying a range that simply overlaps a disclosed range. In fact, when, as here, the claimed ranges are completely encompassed by the prior art, the conclusion is even more compelling than in cases of mere overlap. The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages. ... (A) prior art reference that discloses a range encompassing a **somewhat** narrower claimed range is sufficient to establish a *prima facie* case of obviousness."

Art Unit: 1725

14. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruppel et al. (US 5,821,390) in view of Westerman et al. (US 4,894,205).

Ruppel et al. disclose the features of the reactor set forth in claim 12 above. Ruppel et al. do not specifically teach that the tube ratio changes with tube bundle diameter or a tube bundle diameter.

However, Westerman et al. teach a multitube reactor. Westerman et al. teach that the reactor will have a diameter of about 5 m while reactors with 5,000 tubes have tube diameters of about 45 mm and reactors with 15,000 tubes have tubes with a diameter of about 25 mm. Therefore, Westerman et al. teach that the ratio of tube spacing to tube diameter increases with increasing bundle diameter for a given tube spacing (Westerman et al.; column 1, lines 52-56).

It would have been obvious to one of ordinary skill in the art at the time that the applicants' invention was made to have modified the reactor of Ruppel et al. by the teachings of Westerman et al. One would have been motivated to provide a proper tube bundle diameter for a multitube reactor, as taught by Westerman et al., and to provide the proper tube diameter for a given number of tubes, as taught by Westerman et al. One of ordinary skill would have been further motivated to follow these teachings to provide a reactor design that would have suitable heat transfer properties due to its bundle size and configuration.

15. Claims 12, 17-19, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Groten et al. (US 5,730,843) in view of Ruppel et al. (US 5,821,390).

Groten et al. teach a rectangular multitube reactor (column 5, lines 39-47; and Figure 2). Groten et al. do not teach ratios of catalyst tube spacings to their diameters.

Ruppel et al. teach a multitube reactor with a catalyst tube bundle arranged within an outer wall. The tube bundle includes 5,000 to more than 40,000 tubes. The reactor has means for introducing and discharging a heat transfer medium that flows around the catalyst tubes. The tubes have a length of 2-4 m. Ruppel et al. teach that the ratio of tube spacing to the external diameter of the catalyst tubes is 1.1-2.1 (with a narrower range of 1.2-1.5 when the external diameter of the tube is 30mm, and a specific value of 1.3 when the spacing between tubes is 38mm – see Examples section, column 7). The reactor is also divided in the longitudinal direction of the tubes into several zones so that heat transfer medium will have different temperatures in the different zones due to the transfer of heat. Ruppel et al. teach that this reactor design is beneficial for production of acrolein in a simple manner with reduced formation of hot spots (see US 5,821,390; particularly the Figure; column 2, lines 3-19; column 6, lines 3-12; and the Examples in columns 7-9).

It would have been obvious to one of ordinary skill in the art at the time that the applicants' invention was made to have modified the reactor of Groten et al. by the teachings of Ruppel et al. One would have been motivated to do so in order to provide a reactor design that was beneficial for production of acrolein in a simple manner with reduced formation of hot spots, as taught by Ruppel et al.

Response to Arguments

16. The examiner acknowledges the applicants' amendment/remarks provided in the request for continued examination received by the USPTO on April 12, 2005. The amendment overcomes prior 35 USC 112, 2nd paragraph rejections. However, new objections to the abstract, specification, and claim 12 are set forth in paragraphs 6-8. The applicants have added new claims 22-27, and have amended (withdrawn) claims 20 and 21. However, method claims 20-25 remain withdrawn from consideration as lacking unity (see paragraphs 2 and 3), and reactor claims 12-19, 26, and 27 have been constructively elected by original presentation for prosecution on the merits. Claims 12-19, 26, and 27 are currently under consideration in the application.

17. Applicants' arguments filed April 12, 2005 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on pages on pages 2 and 3 of the amendment, the examiner respectfully disagrees, as Ruppel et al. disclose (anticipate) the applicants' range of 1.3 to 1.6 set forth in claim 12. Regarding the applicants' mention of MPEP 2131.02 and 2131.03, in combination with the statement that "the ratios of Ruppel et al.'s examples are less than 1.3", the range of ratios of Ruppel et al. is only somewhat broader (while being entirely encompassing) than the range of ratios of the applicants (see paragraph 13). Furthermore, the specific example in Ruppel et al. teaches a ratio of 38mm divided by 30mm, which produces a value of 1.3. The applicants' assertion of unexpected results is also unconvincing in view of the

Art Unit: 1725

teachings of Ruppel et al. As a result, claims 12-19, 26, and 27 are currently rejected for the reasons set forth above.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin P. Kerns *Kevin Kerns 4/30/05*
Primary Examiner
Art Unit 1725

KPK
kpk
April 30, 2005